IN THE CLAIMS

1-32. (Canceled)

~~33.~~ (Previously presented) A method for estimating a carrier frequency, the method comprising the steps of:

Step A: ~~Defining~~ defining R levels, indexed by consecutive integers 1 to R, wherein

each level r is associated with a set of data blocks that together make up a set of data that is associated with a received signal;

each data block in the set of data blocks associated with a level r, where r is greater than 1, is made up from data blocks from the set of data blocks associated with level r-1;

the set of data blocks associated with the level R comprises a single data block;

each level r is associated with a set of frequencies; and

the set of frequencies associated with the level R comprises a set of candidate frequencies;

Step B: for each data block in the set of data blocks associated with the first level, calculating at each frequency in the set of frequencies associated with the first level, a pair of I and Q integrals to produce corresponding pairs of I and Q correlation values;

Step C: selecting level 2 to be a current level and selecting level 1 to be a previous level;

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Step D0: selecting a data block in the set of data blocks associated with the current level that has not been previously selected to be a selected data block;

Step D1: selecting a set of constituent data blocks from the set of data blocks associated with the previous level that make up the selected data block to be a selected set of constituent data blocks;

Step D2: selecting a frequency from the set of frequencies associated with the current level to be a selected frequency;

Step D3: selecting the pairs of I and Q correlation values corresponding to each data block in the selected set of constituent data blocks and corresponding to a frequency associated with the previous level which is close to the selected frequency, to be the selected pairs of I and Q correlation values;

Step D4: selecting weights for the selected pairs of I and Q correlation values, based on a difference between the target frequency and the frequency at which the selected pairs of I and Q correlation values are calculated, and also based on the position of the data block that corresponds to the selected pair of I and Q correlation values;

Step D5: weighting the selected pairs of I and Q correlation values according to the selected weights to produce a set of weighted pairs of I and Q correlation values corresponding to the selected data block and the selected frequency;

Step D6: summing the weighted pairs of I and Q correlation values to produce a pair of I and Q correlation values associated with the current level, selected data block, and the selected frequency;

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Step D7: repeating steps D2-D6 until every frequency from the set of frequencies associated with the current level has been selected to be the selected frequency; and

Step D8: repeating steps D0-D7 until every data block in the set of data blocks associated with the current level has been selected to be the selected data block;

Step E: If the current level r is not level R, updating the current level to be level r+1, updating the previous level to be level r, and repeating steps D0-E; and

Step F: Estimating the carrier frequency on the basis of the pairs of I and Q correlation values associated with level R and with the frequencies in the set of candidate frequencies.

2 34. (Previously presented) The method of Claim 33 wherein Step F comprises the steps of:

Step F1: for each frequency in the set of candidate frequencies, calculating a magnitude associated with the corresponding pair of I and Q correlation values; and

Step F2: estimating a carrier frequency by selecting a frequency in the set of candidate frequencies for which the associated magnitude is largest.

3 35. (Previously presented) The method of Claim 34 wherein the received signal is a GPS signal.

4 36. (Previously presented) The method of Claim 34 wherein the maximum magnitude is compared against a threshold.

5 37. (Previously presented) The method of Claim 36 wherein the received signal is

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a GPS signal.

6 ~~38~~. (Previously presented) The method of Claim ~~33~~ 1 wherein the set of data that is associated with the received signal comprises sampled data obtained by sampling the received signal.

7 ~~39~~. (Previously presented) The method of Claim ~~38~~ 6 wherein the received signal is a GPS signal.

8 ~~40~~. (Previously presented) The method of Claim ~~33~~ 1 wherein the set of data that is associated with the received signal is an analog signal.

9 ~~41~~. (Previously presented) The method of Claim ~~40~~ 8 wherein the received signal is a GPS signal.

10 ~~42~~. (Previously presented) The method of Claim ~~33~~ 1 wherein the received signal is a GPS signal.

11 ~~43~~. (Previously presented) The method of Claim ~~42~~ 10 wherein the step of calculating the pair of I and Q correlation integrals is performed coherently based on navigation bit information associated with a global positioning satellite vehicle.

12 ~~44~~. (Previously presented) The method of Claim ~~42~~ 10 wherein the set of candidate frequencies is determined on the basis of an intermediate frequency employed by a receiver and a Doppler shift associated with a global positioning satellite vehicle.

13 ~~45~~. (Previously presented) The method of Claim ~~33~~ 1, wherein the steps B-E are repeated for each hypothesized delay value over a range of hypothesized delay values, to produce a pair of I and Q correlation values corresponding to each candidate frequency and

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each hypothesized delay value.

14 ~~46~~. (Previously presented) The method of Claim ~~45~~ 13 wherein the received signal is a GPS signal.

15 ~~47~~. (Previously presented) The method of Claim ~~45~~ 13, wherein the step of estimating the carrier frequency comprises the steps of:

for each candidate frequency within the set of candidate frequencies and for each hypothesized delay in the range of hypothesized delay values, calculating a magnitude associated with the corresponding pair of I and Q correlation values; and

selecting the hypothesized delay value and candidate frequency that has the highest magnitude calculation.

16 ~~48~~. (Previously presented) The method of Claim ~~47~~ 15 wherein the received signal is a GPS signal.

17 ~~49~~. (Previously presented) The method of Claim ~~47~~ 15 wherein the maximum magnitude is compared against a threshold.

18 ~~50~~. (Previously presented) The method of Claim ~~49~~ 17 wherein the received signal is a GPS signal.

19 ~~51~~. (Previously presented) The method of Claim ~~33~~ 1, wherein the number R of levels equals 2.

20 ~~52~~. (Previously presented) The method of Claim ~~51~~ 19 wherein the received signal is a GPS signal.

21 ~~53~~. (Previously presented) The method of Claim ~~33~~ 1, wherein the number of data

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blocks iii the set of data blocks associated with each level is proportional to a length of the received signal.

22 54. (Previously presented) The method of Claim 53 (21) wherein the received signal is a GPS signal.

23 55. (Previously presented) The method of Claim 33 (1), wherein every data in the set of data blocks associated with the same level has the same length.

24 56. (Previously presented) The method of Claim 55 (23) wherein the received signal is a GPS signal.

25 57. (Previously presented) The method of Claim 55 (23), wherein the number of frequencies in the set of frequencies associated with a level is proportional to the length of the data blocks associated with the level.

26 58. (Previously presented) The method of Claim 57 (25) wherein the received signal is a GPS signal.

27 59. (Previously presented) A method for estimating a carrier frequency, the method comprising the steps of:

receiving data associated with a received signal;

determining a frequency range of interest;

determining a set of coarse frequencies within the frequency range of interest;

determining a set of fine frequencies within the frequency range of interest;

dividing the data into a set of data blocks;

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for each data block of the set of data blocks, calculating I and Q correlation values associated with the data at each frequency from the set of coarse frequencies;

for every frequency of the set of fine frequencies, determining a selected frequency in the set of coarse frequencies, wherein the selected frequency is close in value to the frequency in the set of fine frequencies;

for each data block of the set of data blocks selecting I and Q correlation values corresponding to each coarse frequency to be the selected I and Q correlation values for the corresponding data block and coarse frequency;

selecting weights for the selected I and Q correlation values, based on a difference between a frequency in the set of fine frequencies and the corresponding selected frequency in the set of coarse frequencies, and also based on a position of the data block that corresponds to the selected pair of I and Q correlation values;

weighting the selected pairs of I and Q correlation values according to the selected weights to produce weighted pairs of I and Q correlation values;

computing an approximation to the I and Q correlation integrals over the entire data associated with the received signal, for each frequency in the set of fine frequencies, using the weighted pairs of I and Q correlation values; and

estimating the carrier frequency from within the set of fine frequencies by using the approximations to the I and Q correlation integrals at the frequencies in the set of fine frequencies.

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28 60. (Previously presented) The method of Claim 27 wherein all of the data blocks comprising the set of data blocks have the same length.

31 ~~61~~. (Previously presented) The method of Claim ~~59~~ 27 wherein the length of the data blocks comprising the set of data blocks is chosen to minimize a measure of computational complexity.

32 ~~62~~. (Previously presented) The method of Claim ~~59~~ 27 wherein the set of data that is associated with the received signal comprises sampled data obtained by sampling the received signal.

33 ~~63~~. (Previously presented) The method of Claim ~~62~~ 32 wherein the received signal is a GPS signal.

34 ~~64~~. (Previously presented) The method of Claim ~~59~~ 27 wherein the set of data that is associated with the received signal is an analog signal.

35 ~~65~~. (Previously presented) The method of Claim ~~64~~ 34 wherein the received signal is a GPS signal.

36 ~~66~~. (Previously presented) The method of Claim ~~59~~ 27 wherein the received signal is a GPS signal.

37 ~~67~~. (Previously presented) The method of Claim ~~66~~ 36 wherein calculating I and Q correlation values is performed coherently based on navigation bit information associated with a global positioning satellite vehicle.

38 ~~68~~. (Previously presented) The method of Claim ~~66~~ 36 wherein the set of fine frequencies is determined on the basis of an intermediate frequency employed by a receiver and a Doppler shift associated with a global positioning satellite vehicle.

39 ~~69~~. (Previously presented) The method of Claim ~~66~~ 36 wherein the set of coarse

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frequencies is determined on the basis of an intermediate frequency employed by a receiver and a Doppler shift associated with a global positioning satellite vehicle.

40 ~~70~~. (Previously presented) The method of Claim ~~59~~ 27, wherein the number of data blocks in the set of data blocks is proportional to a length of the received signal.

41 ~~71~~. (Previously presented) The method of Claim ~~70~~ 40 wherein the received signal is a GPS signal.

29 ~~72~~. (Previously presented) The method of Claim ~~60~~ 28, wherein the number of coarse frequencies is proportional to the length of the data blocks.

30 ~~73~~. (Previously presented) The method of Claim ~~72~~ 29 wherein the received signal is a GPS signal.

42 ~~74~~. (Previously presented) The method of Claim ~~59~~ 27, wherein the number of fine frequencies is proportional to the length of the data associated with the received signal.

43 ~~75~~. (Previously presented) The method of Claim ~~74~~ 42 wherein the received signal is a GPS signal.

44 ~~76~~. (Previously presented) The method of Claim ~~59~~ 27, wherein the step of computing the approximation to the I and Q correlation integrals comprises the steps of:

Step A: zero-padding the weighted pairs of I and Q correlation values;

Step B: applying a Fast Fourier Transform on the zero-padded weighted pairs of I and Q correlation values; and

Step C: selecting the values of the Fast Fourier transform at appropriate frequencies to be the approximations to the I and Q correlation integrals at the

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frequencies in the set of fine frequencies.

45 ~~77~~. (Previously presented) The method of Claim ~~76~~ 44 wherein the received signal is a GPS signal.

46 ~~78~~. (Previously presented) The method of Claim ~~76~~ 44 wherein a number of zeros introduced during Step A is determined by a frequency resolution associated with the set of fine frequencies.

47 ~~79~~. (Previously presented) The method of Claim ~~78~~ 46 wherein the received signal is a GPS signal.

~~94~~ 80. (Previously presented) The method of Claim ~~59~~ 27, wherein for each data block in the set of data blocks, the step of calculating I and Q correlation values comprises calculating the I and Q correlation values for each hypothesized delay value over a range of hypothesized delay values.

55 ~~81~~. (Previously presented) The method of Claim ~~80~~ 54 wherein the received signal is a GPS signal.

~~48~~ 82. (Previously presented) The method of Claim ~~76~~ 44, wherein the Steps A, B, and C are carried out for each hypothesized delay value over a range of hypothesized delay values.

50 ~~83~~. (Previously presented) The method of Claim ~~84~~ 49 wherein the received signal is a GPS signal.

49 ~~84~~. (Previously presented) The method of Claim ~~82~~ 48, wherein the step of estimating the carrier frequency from within the set of fine frequencies comprises the steps of:

calculating a magnitude of the approximations to the I and Q correlation

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integrals for each frequency within the set of fine frequencies and for each hypothesized delay; and

selecting the hypothesized delay and carrier frequency that has the highest magnitude calculation.

51 ~~85.~~ 49 (Previously presented) The method of Claim ~~84~~ wherein the received signal is a GPS signal.

52 ~~86.~~ 49 (Previously presented) The method of Claim ~~84~~ wherein the highest magnitude is compared against a threshold.

53 ~~87.~~ 52 (Previously presented) The method of Claim ~~86~~ wherein the received signal is a GPS signal.

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